SCIENCE.

FRIDAY, MARCH 13, 1885.

COMMENT AND CRITICISM.

A PLAN is on foot for establishing in Mount Royal park, Montreal, a botanic garden, to be under the joint care and patronage of McGill university and the Horticultural society. Those who are familiar with the superb park and its deservedly famous drives will at once understand what an unrivalled opportunity Montreal possesses for giving to its citizens another source of enjoyment. With a water-supply practically limitless, and with every needful exposure to the sun upon its slopes, the mountain furnishes as fine a location for a botanic garden at the north as can be imagined. It is wisely suggested that much prominence be given, in the new enterprise, to the special horticultural and arboricultural features which offer so wide a field for profitable study in our northern climates.

Of the educational advantages to university students, of a botanic garden and an arboretum, it is superfluous to speak, since they are self-evident; but it may be well to refer briefly to the great value to a community of a botanic garden as a means of culture to the children in the public schools, as well as to the thousands who can find little time, and who have but little inclination, to acquaint themselves with the world of beauty around them. In a properly arranged botanic garden, the groups of plants having different and interesting habits — for instance, the climbers, the insectivorous plants, the weather-plants, and those which furnish the principal vegetable products — are visited and carefully examined by many who would otherwise seldom look into the book of nature. We presume that no scientific man can object in any reasonable way to such a method of popularizing science. The enterprise is fortunately to receive the judicious care of Professor Penhallow of McGill university. We wish the plan all success.

WE HAVE given space to Mr. Cox's long letter attacking our comments upon microscopists, because he has brought against us an accusation of unfairness. We can assure Mr. Cox that our expressions were induced by no *animus* or personal feeling, but were called forth by the tendency, specially marked in this country, to give a separate dignity to microscopy, and to glorify the tool at the expense of the work. The microscope is a tool, like the tweezers or the hammer; and the sciences cannot be divided according to the tool used. That microscopes are so fine and elaborate may explain, but does not lessen, the error of regarding microscopy as a separate science. To make microscopy as generally understood, a little petrography is patched together with a little anatomy, some parts of botany, a little crystallography and chemistry, and some optics. Mr. Cox invites a comparison with astronomy as the science of what is beyond vision in distance; but the astronomer is not a telescopist, and does not claim that every thing which can be done with a telescope should be grouped together under one science. He recognizes his instrument as his tool.

The microscope is a noble apparatus; and one who thoroughly studies all the principles involved in its construction, and invents improvements in it or its use, is deservedly to be called both a microscopist and a scientific man. Usually the microscopist is, however, confessedly an amateur, and gives his attention to very various objects; while those who use the microscope constantly — the pathologists, embryologists, botanists, petrographers, etc. — unquestionably prefer to be called after the department of science they follow, not microscopists after their instruments. We think

there has been a tendency to exalt the amateur's microscopy to the rank of a separate department of science, and therefore we plead not guilty to Mr. Cox's accusation of injustice. It is proper for *Science* to point out a confusion as to the natural demarcations of the sciences, or to call attention to the fact that there is a body of men who are much interested in certain parts of science, but yet chose their interests in so many fields, that they lack that rigorous thoroughness which is indispensable for pure science, and which, in its turn, makes specialization indispensable.

We regret to announce the resignation, by Professor Harrison Allen, of the chair of physiology at the University of Pennsylvania. Our regret is increased by the fact that the step is the consequence of the pressure of overwork, and the growing demands of a large medical practice. We hope that his professional activity will not prevent the continuance of the important researches upon which Professor Allen has been engaged. The loss to the university will not be readily made good; for Dr. Allen is not only an investigator of thoroughly scientific spirit, but also one who is singularly appreciative of the good work of others, and encouraging to his co-laborers, as has been shown most happily in the recent establishment of the Biological institute at Philadelphia, in which Dr. Allen had efficient participation. The university will certainly miss his experienced co-operation.

It is premature to comment on the plan of examination for admission now under consideration in the faculty of Harvard college. It is known that such a plan has been found, in its general features, to furnish a satisfactory ground of truce between the combatants, and that both the classicists and the modernists in the faculty are well contented to unite in it as affording a wise and fair adjustment of their differences. But the discussion has not yet reached its final stage, and some important questions still remain to be considered. At the proper time we shall lay before our readers a full account of whatever system of requirements is ultimately adopted.

The provisions for the scientific bureaus of the government, made in the sundry civil bill passed at the close of the last congress, are, on the whole, less generous than in the preceding year. The appropriations for the weather bureau, including the military branch ($883,433), and for the coast-survey ($551,498), are slightly greater; those for the geological survey ($467,700) and the ethnological bureau ($40,000) are the same; that for the national museum ($147,500), scarcely less than a year ago; but the fish-commission receives only $256,000, which is $65,000 less than last year; and to the census bureau nothing is given (it received $10,000 last year). Thus the natural necessary growth of some of these institutions is not provided for.

On the other hand, the Smithsonian institution is given $10,000 for maintaining its excellent work in foreign exchanges; $10,000 is appropriated for operating the Watertown testing-machine, and $12,000 for printing the continuation of the catalogue of the medical library attached to the surgeon-general's office; while the joint commission of three senators and three representatives, to consider the present organizations of the signal-service, geological survey, coast and geodetic survey, and the hydrographic office, is continued, and instructed to report at the next meeting of congress.

By the sundry civil bill, the president is authorized, in case of threatened or actual epidemic of cholera or yellow-fever, to use at his discretion the unexpended balance of the sum re-appropriated for this object in July, 1884, together with the further sum of $300,000, in aid of state and local boards or otherwise, "in preventing and suppressing the spread of the same, and for maintaining quarantine and maritime inspections at points of danger; and, by the meagre appropriation of $15,000, the national board of health is resuscitated.

This is emphatically a step in the right direction. Under the provisions of the act, much valuable information in regard to either of the diseases mentioned may be obtained; and, if either of them visits the country, it is to be hoped that something of scientific value will be added to our knowledge of the means of fighting it. We should have been glad to see an additional special clause providing for the appointment of experts to investigate at least the first cases which occur, for it is by the rigid inspection of these often doubtful cases, by accurate diagnosis and successful isolation, that an epidemic is to be arrested. Without a special recommendation of this kind, there seems to be too much danger of the omission of rigorous measures at the most important time.

THE RECTIFICATION of public practice in accordance with scientific theory is always gratifying. Attention was recently called to certain results of the mode of educating deaf-mutes by means of silent signs and in seclusive institutions, — threatening no less a calamity than the creation of a deaf-mute variety of mankind, — and to the desirability of training deaf children in the use of common speech, in association with hearing children, and without removal from family influences. The memoir on this subject by Prof. A. Graham Bell, embodied in the Report of the National academy of sciences presented to congress last year, has led to much discussion of the subject. The first fruits are seen in a bill now before the legislature of the state of Wisconsin, which provides for the establishment of small day-schools for the deaf in any incorporated city or village in the state. These schools will be under the control of the state superintendent of public instruction.

This is a movement in the right direction. Existing institutions for the education of the deaf are under the management of the boards of state charities. But this pioneer legislation of Wisconsin recognizes the obligation of the state to provide education for all her children, not as a charity, but as a right. The establishment of these day-schools was recommended by Gov. Rusk in his message to the legislature last January, in which he says, "There were in Wisconsin, according to the census in 1880, 1,079 deaf-mutes, of whom 600 were of school-age, between six and twenty, and less than one-third of these were receiving instruction." An equally large proportion of deaf children are growing up in ignorance in all our states; and the question is forced on public consideration, whether to enlarge and increase the number of state institutions, or to supplement those already existing by the provision of day-classes for the deaf, in connection with our common schools. The Wisconsin experiment will be watched with interest: its results can only be for good; and the example of that state in taking a new departure of this kind is worthy of being generally followed, that the tests may be conclusive for the whole country.

Prof. A. G. Bell was invited by the committees on education, of the senate and assembly of the legislature of Wisconsin, to present his views for their information; and, after completing his *viva voce* explanations, he addressed an open letter to the committees, in which his arguments are recapitulated clearly and compactly. This document we commend to all who are interested in the subject. We have room for only one quotation: "Out of a total of 33,878 deaf-mutes in the United States in 1880, 15,059 were of school-age; and the total number of deaf-mutes returned as then in the institutions and schools of the United States was only 5,393." This fact alone shows the necessity, not only of doing something, but of doing it without delay.

LETTERS TO THE EDITOR.

**** *Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Decadence of science about Boston.

I OBSERVE that this subject is still discussed in a recent number, but that no one ventures to raise a doubt as to the original assertion. Yet to a layman in science it does not seem that any proof of such

decadence has been offered except the diminished attendance at certain meetings. But is this a proof of decadence, or merely of increasing specialization? No one complains of the decadence of science in and about London, I take it; and yet nothing surprises an American in London more than the small numbers he meets at scientific societies, whose names are famous throughout the world. If I remember rightly, I heard one of the most eminent philologists in England, Mr. Alexander J. Ellis, read his inaugural address as president of the Philological society, in 1872, before about twenty persons, and I attended a meeting of the Anthropological society, with Sir John Lubbock in the chair, and not more than twenty-five present. When we consider that the most eminent popular lecturers on science, such as Tyndall and Tylor, lecture, or lectured in 1872, to popular audiences of only two hundred or three hundred, it is evident that at the British capital the test of numbers can hardly apply. Across the channel it is still worse. At the Collége de France, in 1878, I heard eminent men lecture to audiences of a dozen, although Charles Blanc told me triumphantly that he always had auditors standing up when he lectured on the history of art in a hall holding perhaps fifty. My experience of German lectures is limited, but I was struck with the same thing there. Were I a man of science, it seems to me that I should advance the thesis that it is in the cruder period of scientific knowledge that it attracts large numbers, and that the tendency of specialization is to give 'fit audience, though few.'

Then there is another view which is in the nature of an *argumentum ad hominem*. Does not the very existence of *Science* refute the lamentations of *Science?* If scientific activity is greater elsewhere than in Boston and Cambridge, how came your valuable periodical to be established here?

T. W. Higginson.

Cambridge, Feb. 22.

[Specialization of work is an increasing necessity of science, but wherever it begets absorption of interest, and this specialization of interest infects the whole body scientific, there science in any true sense will begin to show signs of decadence. It was not the small, but the decreasing attendance at Boston scientific meetings; not the attendance only, but the character of the communications made, — to which we drew attention.

As to the *argumentum ad hominem*, Cambridge was taken as the place of publication of this journal, merely from the accident that it was the residence of the editor chosen to conduct it. — Editor.]

Nadaillac's 'Prehistoric America.'

In the review of the American edition of Nadaillac's 'Prehistoric America' (*Science*, No. 108), there are two allusions calculated to produce a false impression, which it seems advisable to notice, as many of your readers may learn all they are ever likely to know of the book from your notice of it.

It is stated that 'quotations and references are incorrectly given.' In any book containing several thousand references, errors are almost certain to occur. Having, in the capacity of editor, to examine many of these references (for none of which I was responsible, as is explained in the preface), I have a much better knowledge of their average accuracy than the casual reader can possibly obtain, and can assure those interested that the person to whom the verification was intrusted performed that task in a way to which no reasonable exception can be taken; and the result is a considerable advance upon the original work, which, like most French books, was defective in this respect. Certain blunders appear in the index, of which no proofs were submitted to me; but they are, so far as I know, of a character to cause no difficulty to an investigator.

The second is a more delicate matter. There are many good persons to whom any comparison of religions which includes their own is painful. For these, anthropologists do not write. It is, I acknowledge, a painful surprise that my endeavor to indicate the kernel of spirituality in a husk of barbarous rites by a reference to a strictly parallel case within our own cognizance, should give offence to any scientific mind. Had I known, however, that this would occur, I should not, even then, have omitted an observation which is undeniably true, and which is necessary to a right understanding of a fundamental feature in the religions of Central America. My language was as follows: "It must be borne in mind, however, that the practice of cannibalism, in many cases was not a mere devotion to a diet of human flesh, but a rite or observance of a superstitious or religious character, not so far removed from the anthropomorphism which, in the middle ages, claimed for the chief Christian rite the 'real presence of body and blood' of the victim sacrificed for the welfare of the race." The inference of the reviewer, that one individual civilized Christian of our day (not to speak of half Christendom) partakes of the eucharist with a belief of mediaeval literalness, is, in my opinion, a libel upon humanity, and carries its own refutation. Such an individual, did he exist, would be no better than an Aztec, and entitled to no more consideration.

Wm. H. Dall.

[In answer to the above, it may be said, 1°, that the statement in the editor's preface that 'many quotations have been verified,' is an admission that all were not, and that, if proof of this fact be needed, it can be found in mistakes like those on pp. 49, 51, 71, and 90, in which the accounts of the figures there given are incorrectly quoted; 2°, that transubstantiation is an essential article of faith in a church which numbers rather more than half the Christian world; and to assert that the sacrament of the eucharist as received by them is 'not so far removed' from the cannibalistic rites of the Aztecs, is an offence which is only equalled by the intimation that those who profess this belief in the actual presence, do not really mean it. In conclusion, the reviewer wishes once again to say, that, in spite of certain defects, "this is the best book on prehistoric America that has yet been published," and he takes pleasure in adding that much of this excellence is unquestionably due to the improvements made by the editor. — Reviewer.]

The photograph of a Dakota tornado.

A photograph of the Dakota tornado, a woodcut of which appeared in No. 107, *Science*, was submitted to me last November, when the question of admitting it in the New-Orleans exposition free of charge for space, was under discussion. The sharpness of outline, and the fact that it was claimed that the photograph was taken at a distance of twenty-six miles, made me doubt its genuineness so much, that I submitted it to two of the best out-door photographers connected with the government surveys. Both pronounced it a manufactured photograph, most probably taken from a crayon-drawing.

J. W. Gore.

Chapel Hill, N.C., Feb. 26.

Supposed crude jade from Alaska.

In *Science* for Dec. 10, 1884, there was given an abstract of the explorations on the Kowak River of Alaska by a party from the U. S. steamer Corwin, Lieut. Cantwell commanding. In this abstract it was stated that beds of a beautifully mottled serpentine were found in the mountains near the river, "as well as the so-called 'jade,' used far and wide for the most costly and elegant stone implements, which is perhaps the variety pectolite recently described by Clarke from specimens got at Point Barrow." It was also stated that 'Jade Mountain' seemed to be entirely composed of the green stone, about one hundred pounds of which were collected.

The collections on the return of the party were forwarded, as usual, to the national museum, as were also those made a little later from nearly the same localities by Lieut. Stoney's party. Both lots were referred to the writer for examination and report, and were found to consist largely of serpentine and a greenish gray quartzite, together with other miscellaneous material not necessary to mention here. The serpentine is mostly the ordinary green massive variety, though a few pieces of the columnar and fibrous forms picrolite and chrysotile are present. The quartz rock, which is doubtless the material mistaken by both parties for 'jade,' is light greenish in color, very fine grained, compact, and hard. Under the microscope, it is seen to be distinctly granular, but not perfectly homogeneous, containing innumerable exceedingly minute micaceous particles of a greenish color, and to the presence of which is doubtless due the color of the stone. There are also present many minute colorless needlelike crystals too small for accurate determination. Its specific gravity, as determined by a Jolly's balance, is 2.66, and a chemical test by Professor Clarke yielded 94.49% of silica. The rock is therefore radically different, not only from the Alaskan pectolite, but from any of the so-called 'jades' from any source that have yet been examined. An examination of the collections brought from Alaska has failed also to bring to light a single implement or ornament manufactured of this material: hence we must conclude that all the parties concerned were misled by the color and hardness of the stone, and that the true source of the so-called 'jade' is yet to be discovered.

GEO. P. MERRILL.

National museum, Feb. 28.

'What is a microscopist?'

You seem to have run short of subjects for 'Comment and criticism' in your issue of Feb. 27, for otherwise I cannot believe that you would have written your ill-natured remarks upon 'microscopists.' If you had confined yourself to the definition of a microscopist as "an amateur who rejoices in the beautiful variety of microscopical specimens," I should have offered no protest; for I recognize in that definition a truthful, though only partial, description of a class to which it has long been my pleasure to belong. If you had been content to express your belief that the term 'microscopy' is a misnomer, and that the large and growing body of so-called 'microscopists' is not to be regarded as a division of the 'regular army' of science, I should still have held a humble and respectful silence, because I can see how such an opinion may be very honestly and very plausibly maintained. But your remarks call for a protest on the ground, that, instead of helping to a true estimate of the scientific spirit, they set up narrow and exclusive standards, and are essentially and offensively personal.

Microscopists, as far as they are mere amateurs and 'universal gatherers,' may perhaps not be entitled to more consideration than is due to 'camp-followers' and 'hangers-on;' although I think there is possibly a question as to your right to give them notice to leave. I am not sure but that I might argue, with some success, that many microscopists are more than amateurs, or that many recognized scientific specialists are, after all, only skilled microscopists; but why dispute over mere names? I am one of those who believe that in the most effective use of the modern microscope there are required a degree of technical skill and an amount of special knowledge which raise it to the rank of a distinct scientific pursuit. You, on the contrary, appear to look upon the microscope as you do upon the tweezers, the scissors, or the hammer, — as an instrument so simple that any student in any department may take it up without previous special training in its use, and obtain from it at once trustworthy results. But I beg to inform you, if you do not already know it, that, in the more delicate kinds of microscopical work, it is absolutely essential to employ expert methods in manipulation, and to apply very particular principles of interpretation, or else the conclusions are likely to have no value whatever. The exhibition of pretty things because they are pretty, and for the mere amusement of lookers-on, is no more microscopy than the making and administering of laughing-gas is chemistry.

But you seem to infer that microscopists are not properly scientific men, since they are not generally specialists; and the ground of your inference appears to be that such microscopists as you have happened to know have directed their attention to very various objects obtained from the different realms of nature. But might not the same criticism be made upon chemists, who analyze and weigh every sort of substance, — animal, vegetable, and mineral? Why is it more legitimate for them to rest their science upon a basis of molecular and atomic weights than for others to build a microscopical science upon a system of micrometric measurements? I should not quarrel with you if you urged the expediency of restricting the term 'microscopy' to a branch of physics, or even of optics, because we may all fairly differ about questions of classification; but, as things now are, I cannot discover the force of your objection to the recognition of microscopy as a division of general science based upon the fact that the subjects of its investigation are beyond the range of unaided vision in one direction, since astronomy, whose right to the name of a science you probably do not question, is founded upon the fact that the objects of its study are beyond unaided vision in another direction. In both cases, it seems to me, the science is conditioned by its instrumental requirements. In one instance it is the science of the microscope, in the other it is the science of the telescope. Why not object to astronomy because of its foundation in 'a common quality' of remoteness in space, or to paleontology as based upon 'a common quality' of remoteness in time?

But I have no intention of endeavoring to justify a claim on behalf of microscopists to be admitted to the sect of orthodox scientific men. I merely wish to speak a good word for the class as it now stands. I am fortunate in being acquainted with a number of cultivated and educated men, both amateur and professional, who make constant use of the microscope, either in the pursuit of their regular business occupations or in their private intellectual life, and who take pains to keep informed as to the improve-

ments being made in the instrument and its accessories, as well as in the methods of its manipulation and application. Some of them join with others of like predilections in organizations which are commonly called 'microscopical societies,' the purposes of which are mutual stimulation and the enjoyment and propagation of scientific — shall I say dilettanteism? — yes, if you like. At any rate, these gentlemen are engaged in very nearly the same kind of work that *Science* is engaged in; and many of them take your paper, and not only read it, but, when it presents subjects which they can illustrate or test by means of their microscopes, they undertake to see for themselves, and form their own conclusions. A smaller number of them even presume to make original investigations of one kind or another; and some of them actually add a new fact now and then to the great treasury of scientific truth, though it may often be such a little fact as not to attract much attention. I do not think they are usually men of great conceit; and I have never happened to come in contact with one who was over-anxious to be considered a 'regular' scientific man, or to receive any particular recognition by learned bodies. Generally speaking, I have found them to be gentlemen of simple and unpretentious devotion to nature, who had found themselves, somehow, endowed with a preference for those things which are invisible to the average sight, and who had imbibed the teachings of those who, like yourself, have advocated the popularizing of science.

But in this class are some who have earned and compelled recognition as men of science; and in London and in Brussels (to say nothing of home organizations) are microscopical societies of world-wide fame and importance, which have long been looked upon by some of us as bodies of scientific men. In their lists of fellows are such names as Dr. W. B. Carpenter, Dr. Lionel S. Beale, Prof. F. Jeffrey Bell, Rev. W. H. Dallinger, Prof. P. Martin Duncan, Dr. Henry VanHeurck, and many others whose scientific attainments speak for themselves, and no one of whom would disdain the name of '*microscopist*.' In our own country, I may with propriety mention one who has but recently passed away, and who, although possessing other claims to scientific eminence, achieved his greatest reputation and his most lasting fame in the field of pure microscopical manipulation. I refer to the late Dr. J. J. Woodward of the U. S. army, who was pre-eminently a *microscopist*, and who did every thing he could to promote and encourage the finest kind of technical and test work. His labors in that direction, with those of others of like proclivities and skill, have done more than all other causes to bring about the present wonderful perfection of the microscope objective. By the work and the demands of such manipulators, the great manufacturing opticians, like the late Mr. Spencer and Mr. Tolles, have been encouraged and stimulated to produce the latest marvels in optics, — the 'homogeneous immersion' lenses.

In view of the valuable services of such men as I have mentioned, I am at a loss to understand your arrogant assertion that 'scientific men have been very lenient towards the microscopists.' Is it to be understood that you are about to advocate some new standard of orthodoxy, or to put into operation some new formula of excommunication? Permit me, further, to inquire whether you really consider it unscientific to choose skilfully and neatly prepared specimens, carefully classified, neatly labelled, and systematically catalogued and stored? Is it amateurish to prefer a good and complete instrument to a cheap and imperfect one? Is there any particular virtue in working with poor tools when good ones can be obtained? Is there any thing unworthy in patience and painstaking? Is any thing in nature too small to be worth examination, or any fragment of knowledge too insignificant to pay for its acquisition? If you disclaim any such sentiments as these, why speak disparagingly of well-made 'slides,' of fine 'test objects,' of 'delicate diatoms' and 'podura scales,' of 'bits of tissue,' of 'polarizing crystals,' or, 'in short, almost any tiny scrap of the universe'? For when you talk so flippantly of these things, you certainly leave the impression on some minds that there may be matters so trifling and so tiny that they belittle the man who admires or studies them; and instead of promoting the general cause of science, as you profess to be desirous of doing, you cast in the way a stumbling-block of petty prejudice.

C. F. Cox.

New York, March 1.

THE SOLAR ECLIPSE OF MARCH 16.

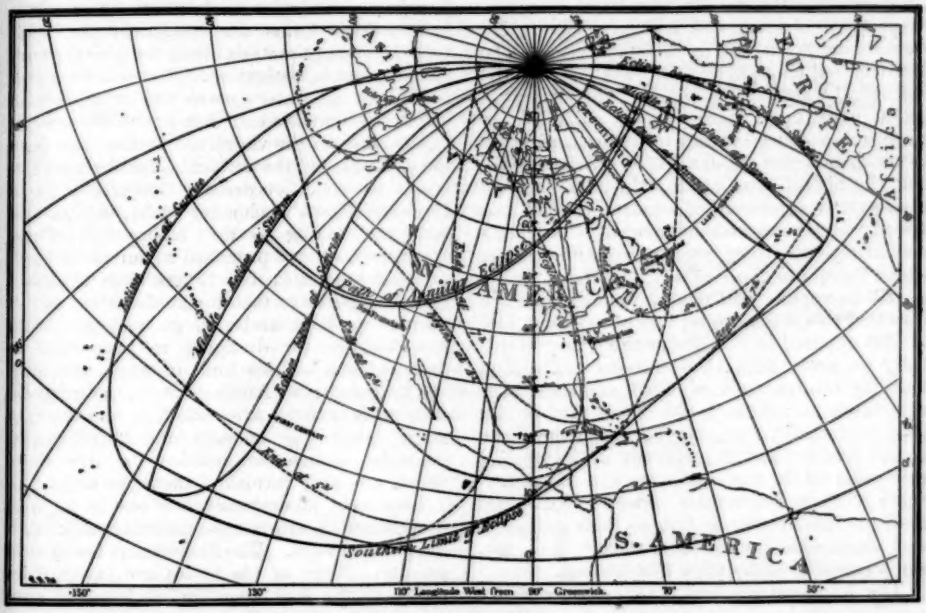
Attention has already been drawn to the chief circumstances of this eclipse in the *Science almanac*, or at p. 578 of the last volume of *Science*, where the times of beginning and ending are given for a large number of places in the United States. The annular phase will be visible only within the limits of a belt between thirty and forty miles wide, which lies over a very sparsely settled tract of the North-American continent, and which is difficult of access at this season of the year. In the United States generally, the eclipse will be visible as a partial one on the afternoon of the 16th in the eastern states, and in the forenoon in the western.

Regarding the cycle of eclipses called the Saros, this eclipse is a 'return' of the annular eclipse of the 22d of February, 1849, visible almost wholly upon the North Pacific Ocean, the track of the annular phase skirting the eastern shores of Japan; also of the annular eclipse of March 5–6, 1867, which was visible as a partial eclipse over almost the entire European continent, and the greater part of Africa and Asia; the central line of annular phase running through northern Africa, crossing the Mediterranean and southern Italy, Russia and Siberia, and which was observed at a large number of European observatories. The next return of the eclipse following the present one will occur in the latter part of March, 1903.

Annular eclipses are usually regarded as a useless and insignificant sort of celestial phenomenon, and astronomers in the past have given very little attention to the observation of them. In comparison with the imposing spectacle of a total eclipse of the sun, an annular

eclipse is doubtless entitled to interest the average observer but little; however, it is quite possible that the rapid development of the means of eclipse research may in time lead to the utilization of annular eclipses with quite the same regularity that total eclipses are at the present day observed. In so far as we have learned, astronomers have made no preparations for observing this eclipse within the belt where the annular phase is visible.

The notion that an annular eclipse is an indifferent species of occurrence has certainly been helped along by the deceptive way in which these eclipses are almost always represented in astronomical treatises, where the ratio of the semi-diameters of the sun and the moon are unnecessarily out of proportion; and frequently that of the moon is drawn only three-quarters that of the sun, thus giving the impression that a very large proportion of the total light of the sun is unextinguished at the time and place of central eclipse. In point of fact, the greatest breadth the annulus can have, under the most favorable circumstances, is only about a minute and a half of arc, or less than one-tenth the semi-diameter of the sun at the time; while not infrequently — as is the case with the annular eclipse which occurs on Monday next, when the moon's semi-diameter is only one-thirtieth part less than the sun's — the eclipse which is put down in the almanacs as annular, only barely escapes being total. It seems very possible that a strongly developed corona might be observed on such occasions: indeed, the experience of many observers who have followed the corona after the total phase, makes it quite probable. To be sure, the duration of the annulus at such times is very short; but, if the corona could be observed on these occasions, we should be able to halve the intervals of an observation as conducted by the present methods at the times of total eclipses only.



ANNULAR SOLAR ECLIPSE OF MARCH 16, 1885.

THE ANNISQUAM SEASIDE LABORATORY.

WE have in America two classes of summer schools of natural history, — one in which only original investigators are allowed to study (Professor Agassiz's laboratory at Newport, the Fish-commission laboratory at Wood's Holl, and the Johns Hopkins laboratory at Beaufort, being examples); the other where students of

all grades, both beginners and specialists, are admitted. The Massachusetts laboratories at Salem, Cottage City, and Annisquam, are examples of this class; and these differ among themselves. Those at Salem and Cottage City have been conducted on the plan of giving lectures, and supplementing them with laboratory work. They have had little success; and, in fact, that at Salem has been closed for two years, because of small attendance, and lack of funds, for it can readily be seen that the lecture system is an expensive one. The laboratory at Annisquam has a distinct policy, due to Professor Hyatt's and Mr. Van Vleck's experience, much simpler and less expensive. No lectures are given, and no classes formed. The fundamental consideration in each case is the individual wants of the pupil. The student is set at work upon some special animal or in some line which he wishes to follow, and made to study and see for himself, frequently without the aid of text-books, which are seldom used except as means of confirming what has already been seen without their aid. Students not infrequently come from schools and colleges where the old method of teaching from books is still in vogue; and though imbued with the idea that this is the proper way of teaching, and at first opposed to the new method, they eventually go away with their notions concerning teaching always much modified, and sometimes completely revolutionized. That this is the proper method of teaching biology, there can be no doubt; and the amount of knowledge possessed by the students at the end of the season's work is remarkable indeed. Advanced students are allowed to choose their specialty, and study what they please; though they, too, are advised to study after this method.

The Annisquam school is the outgrowth of a small private laboratory which Professor Hyatt had in his own house at Annisquam. The number of applicants increased to such an extent, that the limited accommodations at Professor Hyatt's disposal would by no means satisfy the demands. Some of the members of the Woman's educational association of Boston who were interested in this branch of education, and knew these facts, took the matter in hand, and, though uninfluenced by any direct solicitation from Professor Hyatt or others, offered to found a laboratory for the use of both sexes, provided its departments of instruction could be carried on by the officers of the Boston society of natural history, of which Professor Hyatt is curator.

Annisquam, the place chosen, is an extremely pretty and quiet village on the north side of Cape Ann, a few miles from Gloucester, and two hours' ride from Boston by stage and rail. The granite, surf-beaten shores and the bowlder-covered granite hilltops are found on all sides. All conditions necessary to the existence of a variety of marine forms are present on these shores. There are tide-pools, rocks, mud, sand, eel-grass, and marshes, all alternately covered with water, and exposed to the collector, by the strong tides which rise and fall from nine to eleven feet twice each day. All kinds of shore and surface forms are found in an abundance equalled by no place south of Eastport. Embryos and adults of common and curious forms are constantly met with, thus furnishing material both for general work and original investigation. For collecting-purposes, the laboratory owns two row-boats, in which the students can visit any of the collecting-grounds in the vicinity. It has also been the privilege of the students, for the past four years, to make occasional dredging-trips in Professor Hyatt's schooner-yacht, though this does not belong to the laboratory. These excursions are not promised as an inducement to draw students; but it has been Professor Hyatt's custom to take the students out as frequently as they desire to go, and give them opportunities for dredging in proportion to their interest in this kind of work, whenever the Arethusa is at Annisquam. Dredgings are then made in from fifteen to fifty fathoms, and many interesting animals are added to the students' collections, besides the new forms which are thus furnished them for study.

Like most laboratories, this one is far from prepossessing, either from an external or internal point of view. The foundations are of solid granite. Most of the tables are fastened directly to the wall to allow microscopic work to proceed with little jarring. Each table is furnished with a small glass aquarium fed with salt water flowing from a tank which is filled by a windmill. The pipes from this are all wooden, so that there is no trouble with iron-rust. In the centre of the room are larger aquaria. There is also a photographic room, an attic, and a basement for storage. There is a good collection of chemicals, even those for fine microscopic work being well represented.

The school is open to all who intend to make use of the knowledge they obtain in teaching or in original investigation. The charges being merely nominal, those of limited means are not excluded by exorbitant fees; and the only obstacle of a pecuniary nature is the necessarily high board at seashore places. A few investigators have already made use of the

laboratory; and the best tables and facilities are reserved for any of this class who may select Annisquam in order to pursue their work in any special department, whether botanical or zoölogical. For the four years the average attendance has been sixteen. Last year there were, in all, fifteen, but at no one time more than twelve. There are comfortable accommodations for about eighteen persons when all the seats are filled, and this is considered the extreme limit in numbers at any one time.

The students come from all parts of the country east of the Rocky Mountains. Professor Hyatt is the director, and has one assistant; and neither receives any remuneration for his special services. A building specially constructed for a laboratory is much needed, as well as a steam-launch in which to make surface-towings, — a class of work little carried on in our waters, but the value of which should not be underrated. For the successful maintenance of this laboratory, it should possess a regular fund; for some fear exists that the Woman's association may at an early date withdraw its support. This would be sincerely regretted; for the Annisquam laboratory has marked out for itself a course, which, with proper support, will result in great advantage to American science. As it is, the ladies of the Boston association may well be proud of their beginning, and they may be sure that they receive the thanks of a large class of students who have profited by their venture.

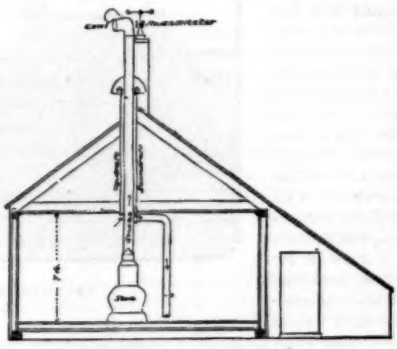
THE HUDSON-BAY EXPEDITION OF 1884.

WITH Manitoba, and the Canadian North-west beyond it, promising to become a vast wheat-producing country, a convenient outlet for surplus grain is most important. Taking Winnipeg as the converging point of all grain to be shipped, we find that the distance to Montreal by the shortest road, the soon-to-be-opened Canadian Pacific railway, will be fourteen hundred and thirty miles, and thence by water to Liverpool, *via* Cape Race, twenty-nine hundred and ninety miles; while if that large inland sea, Hudson Bay, could be utilized as part of a continuous water route to Europe, it would involve only seven hundred miles of rail transport to York Factory, and twenty-nine hundred and forty-one miles of water to Liverpool.

That the bay and strait are navigable to a limited extent is proved not only by the voyage of the intrepid navigator who bequeathed his name to them and left his body on their shores, but by the fact that the Hudson-Bay company has had ships sailing from England to York Factory annually for a great number of years, to take in all the supplies required in its western trade. But the voyages of these vessels, entering the bay only once a year, at the most favorable season, could throw little light upon the extreme duration of navigation; nor could American whalers entering the bay add much to our information, as they winter and pursue their avocation usually altogether too far to the northward.

The desire for further information on this important subject culminated in the appointment of a committee of investigation by the Canadian house of commons during its last session, and the appointment of an expedition under the command of Lieut. A. R. Gordon, a retired naval officer, and assistant director of the Dominion meteorological service. The plan adopted was to establish on the shores of the strait six observing-stations, — one on each side of the outer entrance, two similarly situated at the inner entrance, and the third pair dividing the distance between these, as stated briefly in No. 78 of *Science*.

A Newfoundland sealing-steamer, the Neptune, was chartered to convey the expedition; and, on the outward voyage, four stations were located: viz., at Port Burwell, on the north-western shore of Cape Chudleigh, at the entrance to Ungava Bay; at Ashe

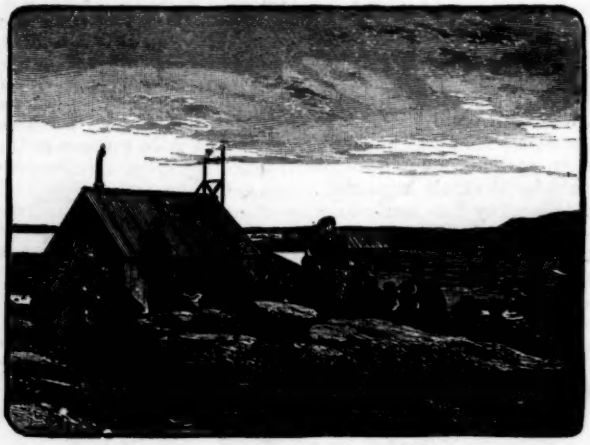


SECTION OF OBSERVERS' HUT.

Inlet, near North Bluff, on the island called by Lieut. Schwatka Turenne Island; at Stupart's Bay, about three miles away from the strait, along the north-west coast of Prince of Wales Sound; and at Port DeBoucherville, on Nottingham Island, near its most southerly point. Each of the stations was named after the observer stationed there. The steamer then ran across Hudson Bay to its north-west angle, and visited the whalers' harbor on Marble Island, where a letter was found from Capt. Fisher, of the whaling-bark George and Mary, dated the 7th of August, stating that they had experienced a very cold winter and spring, with the thermometer four degrees below zero on the 23d of May; that the ship had got out of her winter quarters on the 7th of June, but had been unable to get up the Welcome or to the east shore in consequence of ice.

Continuing her voyage, the Neptune visited Fort

Churchill, where arrangements were made with one of the Hudson-Bay company's officers for taking auxiliary observations; thence to York Factory, where, in consequence of shoal water, the steamer was obliged to anchor eighteen miles from the post,—a fact likely to prevent this most important station of the Hudson-Bay company from attaining commercial importance. At this place there has been for some years an observer in connection with the meteorological service, and nothing more was required than comparison and adjustment of instruments. From York Factory the return trip was begun on the 12th of September, and a fifth station was established on the south-western extremity of Digges Island, where a good harbor, named Port Laperrière, opposite to, and forty-five miles from, Port De-Boucherville, was found. The vast stretches of ice encountered in this end of the strait point to these two stations as of the highest importance. There remained now but one station to establish, which had been intended for Resolution Island or the lower Savage Islands. On both trips this neighborhood was carefully examined, but no harbor could be found; and the station was consequently fixed at Skynner's Cove, on the north side of the entrance to Nachvak Bay, — a position apparently not calculated to aid materially the objects of the expedition.



OBSERVERS' STATION AT STUPART'S BAY.

At each of the six stations an officer is in charge, with two assistants. For their accommodation a hut sixteen by twenty feet, divided into three rooms, with a porch and storehouse attached as a lean-to, was erected. It has double walls of board, with an outer and inner air-space formed by a sheathing of tarred paper; and it is intended to further protect it from cold by covering it outside with sods or grass, and, over all, with snow. For heating, a base-burner cooking-stove, with twenty tons of anthracite coal, is provided; and the smoke-flue of galvanized iron is ingeniously designed, not only to guard against fire, the misfortune most to be dreaded, but to provide, as well, an up-draught for foul, and down-draught for pure air, if required. Only twelve months' provisions were left; but they were selected as preventives of scurvy, and to give the greatest possible variety of nutritive food.

Meteorological observations are to be taken regularly throughout the year, at four-hour intervals, three of these times being synchronous with the series taken by the regular observers of the meteorological service.

After each observation, during daylight, the strait is to be examined with the telescope, and a record of its state written down *at the time*, including direction, and, when possible, velocity of tide, movements of any ice, and whether much broken up, solid field, etc. Each day the time and height of high and low water are to be observed, and, during the open season, the character of the tide noted for two days before, and three days after, the full and change of the moon. Detailed instructions for making these observations, and checking the zero-mark on the tidal-post, were given the officers.

In the official journal which is to be kept must be also entered any thing observed regarding the migrations of birds, seals, and walruses, the movements of fish, etc., and the growth of grasses, as well as the result of observations on the disputed question of the depth to which water will freeze during an arctic winter.

At Mr. Stupart's station, in addition to the work at the other posts, special observations of magnetic phenomena are to be taken, for which a suitable building is provided.

In working through the strait, especially towards its western end, the ordinary compass was so sluggish as to be almost useless, and in this contingency the Sir William Thomson compass card was found to work admirably.

No icebergs were met, nor were reports obtained of their occurrence, in the bay. In the strait a large number were seen, principally along the north shore, where many were stranded in the coves; but some were met with in mid-channel. Of those seen in the eastern end of the strait, some had undoubtedly come in from Davis Strait, passing between Resolution Island and East Bluff; but all of those met to the westward had come from Fox Channel, or perhaps from the still more remote waters connecting with it, all of which have a southerly current.

Observations made by Mr. Ashe from his station on Turenne Island showed that a berg coming in

sight from the westward would pass out of view of his station to the eastward in from three to four tides, this indicating an easterly set of upwards of ten miles a day.

The icebergs seen from the Neptune in Hudson Strait in August and September were not more numerous, and would form no greater barrier to navigation, than those often met with off the Strait of Belle Isle, where, and off the Labrador coast north of it, a great number were encountered on the outward voyage of the Neptune.

Ordinary field-ice was met with off North Bluff, on the 11th of August, which, though it would have compelled an ordinary iron steamer to go dead slow, gave no trouble to the Neptune; the mate on watch running the ship at full speed between the pans, rarely touching one of them. In Ashe Inlet the ice came in with the flood-tide, and set so fast that the Eskimo were able to walk off to the ship, a distance of three-quarters of a mile. Similar ice was found on the south shore, opposite, but none in the middle of the strait so far east. In proceeding from this point to Salisbury Island, long strings of ice were frequently seen; but, as their direction was parallel to the course, the vessel coasted round them. The Eskimo reported that they had never seen the ice hang to the shores so late in the season, and that at all points there were unusually great quantities. On the homeward voyage none of this field-ice was seen.

Off Nottingham Island the ice got so heavy and close, that the attempt to force the ship through it was given up, after one blade of the propeller had been broken off, — an accident that entailed a delay of three days to fit in a new fan. In this ice, too, were seen four vessels, fast in the channel to the southward; one of them being the outgoing Hudson-Bay company's vessel, and another an American whaling-schooner. This ice was of an altogether different type from that hitherto met. Some of it, left dry at low water, was over forty feet in thickness, — not field-ice, thickened by the piling of pan on pan, but a solid blue sheet of ice, which had evidently been frozen just as it was found. The average thickness of the ice passed through, in the neighborhood of Port De-Boucherville, was upwards of fifteen feet.

From the reports of the Hudson-Bay company's ships, the evidence of Capt. Fisher's letter above quoted, and the experience of the Eskimo encountered, the conclusion is reached that 1883 and 1884 were exceptionally severe seasons, and the navigation more than ordinarily interrupted by ice; but the average of many years' observations at Fort Churchill, the only known harbor on the west coast of the bay, shows that the middle of June and the middle of November would be the extreme limits of time during which approach to that coast would be possible; and these limits agree closely with those of the open season in Nachvak harbor, on the Atlantic coast.

If the Neptune had been running direct from Cape Chudleigh to Churchill, instead of coasting, it is considered that she would not have been delayed by ice more than forty-eight hours; but no ordinary iron steamship, built as a modern freight-boat is, could have got through the heavier ice met, without incurring serious risk, if not actual disaster.

From the resident factor at Churchill it was learned that the bay never freezes so far out but that clear water can be seen. From the greater heat of the water, the absence of icebergs at all seasons, and the absence of field-ice on the voyage, even at Chesterfield Inlet, in the extreme north-west corner of the bay, it is evident that the bay itself is navigable for a much longer period each season than the strait.

Some high tides and heavy currents were noticed. During two days in which the Neptune was lying-to off Cape Chudleigh, in fog, she was set forty miles to the southward, which indicates the necessity for caution in approaching the strait in thick weather. At Port Burwell the rise of spring tides is nineteen feet, with a current of about four knots in Grey Strait, which causes, when the wind is adverse, an ugly sea. At Ashe's Inlet there is a rise of thirty-two feet, with a strong tide-race, and a current sometimes reaching six knots within three miles of the shore. At Fort Chimo the rise of spring tides is thirty-eight feet and a half. At Stupart's Bay there is a rise of twenty-eight feet; but the currents are not so swift as on the opposite shore, probably because the water is shallower.

Complete meteorological observations were taken on board the Neptune during the voyage, which when afterwards compared with those taken during the same period at Belle Isle, — a station of the meteorological service in the regular summer trade route between Quebec and Europe, — showed that during August and September the weather of Hudson Strait, so far as affects navigation, compared favorably with that of the Strait of Belle Isle; there being eleven heavy gales at the latter place against three in the former, as well as more than double the amount of fog.

Lieut. Gordon, in concluding his report, urges, that, as observations of one year will probably not give a fair average, the stations should be continued for a second year, and two or three of them even for a third year; that next year's expedition should leave Halifax by the middle of May, and relieve the stations, or, if the ice prevented this, the ship should push on and investigate once for all the condition of the ice in the strait and bay in the early part of the season. If the stations could be relieved, an effort should be made to reach Churchill by the opening of navigation there, — about the 15th of June; then a running survey should be made on the east coast, some deep-sea dredging and sounding done, and beacons erected on the low-lying shores of Mansfield and Southampton islands. This would allow the ship to reach the strait again by the middle of August, when any spare time could be employed in surveying it more accurately; or as an alternative, the fishing, especially the whaling in Rowe's Welcome, which is becoming of some importance, might be investigated with a view to proper regulation of the trade.

WM. P. ANDERSON.

GEOGRAPHICAL NEWS.

Paul Fauque has returned to Paris from a scientific mission to Sumatra, with much valuable information touching the people of the country of Siaks and the kingdom of Atcheen. In the course of the journey he obtained precise information in regard to the causes and incidents of the death of Messrs. Wallon and Guillaume, assassinated by the natives on the river Tenom in 1880, as well as on the mineralogy and natural history of this great island. Numerous photographs of the country and people were secured.

François Deloncle, accompanied by an English and a French civil engineer and a Siamese commissioner, has been engaged in an inquiry as to the possibility of cutting the isthmus joining the peninsula of Malacca to the mainland, in north latitude 7° 14′. Here they discovered a little independent state called Samsam, formerly the resort of pirates, and now semi-independent of Siam. The inhabitants are a *métis* of Malay and Siamese blood. Here deep inlets penetrate the coast, joining an inland sea, which was now first seen by Europeans. It is about twenty feet deep, and forty-five miles long, having a greatest width of twelve miles. It presented a very singular appearance, being plentifully strewn with small islands of compact limestone covered with swallow's nests. This sea is fresh during the north-east, and salt during the south-west monsoons, and separates the island of Tantalam from the peninsula by a multitude of passages not represented on any chart. The section of the peninsula was made at Talung; and specimens brought back show the presence of auriferous quartz, tin, and iron. The report of the expedition will contain important anthropological as well as geographical documents. Returning, Deloncle also examined Adam's Bridge, between Ceylon and India, and will report that the establishment there of a maritime passage is entirely practicable.

Sorokin has recently published an account of his journey in the central range of the Thian-Shan, where, among other discoveries, he found the so-called ruins of cyclopean buildings to be due to natural causes acting on rock *in situ*. Dr. Regel has returned to Tashkent with his collections from Hissar and Karategin.

Les missions catholiques, published at Lyons, contains in almost every number rich contributions to geography or ethnology, as well as to the history of missions. Among others, it has recently contained the itinerary and map of a journey across Kwangsi and Kong Cheo, by Father Chouzy, and a journey on the Niger, by the missionaries of the church in Africa. The abbé Desgodins, in the same review, announces his establishment in a new English outpost in Thibet, at Pedong, forty-five miles north-north-east from Darjiling, where he will continue meteorological observations, as previously at Bathang, his former station.

Giraud, to whose critical situation, abandoned by his caravan, recent reference was made in this journal, has arrived safely at the mouth of the Zambezi. It appears, that, after leaving Karema, he endeavored to penetrate westward, in spite of disquieting rumors and symptoms of mutiny in his caravan. He succeeded in crossing the lake in native canoes, and in a month had reached the Belgian station of M'pala. Here, unsettled by rumors of difficulty on their proposed route, his party revolted, and proceeded to pillage villages where he had previously been received with kindness. He was therefore compelled to return. With a small party gathered on the shores of Lake Tanganyika, he reached the north coast of Lake Nyassa, descended in a little boat to Shiré, endangered by the hostilities between the Portuguese and the natives, but succeeded in reaching the Zambezi and Kwillimané in safety, in good health, with numerous notes and collections, and, at last accounts, was on the point of returning to Europe.

From the *Missionary herald* for March we learn that Mr. Richards of the East-central African mission made a journey in October, 1884, from Inhambane to the Limpopo River. He went through an unexplored country in search of a tribe whose chief settlement was reported to be Baleni on the Limpopo, and who spoke a language akin to Zulu. Between thirty and forty miles westward from the coast he crossed a river called the Bombom, which may be the Luizi of some charts on which it is represented some three times the distance from the coast. No other important river was noticed until the Limpopo was reached. The country is almost wholly marshy, and covered with brush or low palms, with ponds here and there. The thermometer ranged between 80° and 90° F. The Amakwakwa tribe, encountered forty miles from the coast, had been subjected to chronic pillage by Umzila's fighting men, and had abandoned agriculture in consequence. They were idle, living on the wild fruit which is abundant, and getting very drunk on the native wine afforded by the scrub palm, which produces a rapidly fermenting sweet sap at the rate of a pint a day per tree. Many kraals were deserted, and a tract of country seventy-five miles square was nearly desolate. About a hundred and fifty miles from the coast, the Amagwaza people were encountered, who gave the travellers a cordial reception as soon as it was found they were not Portuguese. They are subject to Umzila, whose capital kraal is far to the north, but most of whose people live south of the Sabi River. Baleni was said to be on the Limpopo three days south from the point where Mr. Richards reached it. Time did not suffice to visit it. The return was made through a rather openly wooded country, where the trees bore long wreaths of a gray tree-moss, and beautiful birds were abundant. Elephants abound in this district. In three days the ridge between the Limpopo and the sea was reached, where live an industrious kindly people, with sheep, cattle, and large gardens. By the pedometer the crest was fifty-seven miles from the sea, and seventy-eight from the river. The people of the region appear to have been originally of Tonga race; but, conquered by the Zulus and Portuguese, their language has been modified by the superior nationality in its respective districts.

The long-disputed questions as to the ancient bed of the Amu Daria, or Oxus, appear to have received a final settlement in the publication of the studies of Konshin of St. Petersburg. According to him, the river has never directly emptied into the Caspian; but it is probable that at some period an indirect communication has existed between them through Sari-Kamich Lake and the Uzboi, which drained it. The lake was of much greater area, and its overflow reached the Caspian by the Uzboi: its character was saline or brackish. Were this state of things restored, we should have an immense Turanian sea, composed of a northern basin corresponding to that of the Sea of Aral, and a southern one corresponding to the Sari-Kamich area, connected by a wide but shallow neck of water. Into the former the Sir-Daria would empty, with the Sari-Su and the Chiu; into the latter, the Oxus, the Tedient, and the Murghâb. The overflow of brackish water would find its way by the Uzboi to the Caspian.

Those interested in the question of lakes with two outlets would do well to incite exploration of Frances Lake in the North-west territory. This lake, discovered many years ago by Robert Campbell, now of Winnipeg, was reached by him from the head waters of the Liard River, ascending, according to his account, a small stream actually proceeding from the lake. To his surprise, on the other side he found a communication, during the time of high water, with the head waters of the Pelly River. In 1865 information received from officers of the Hudson-Bay company at Victoria, by those of the International telegraph expedition, was to the effect that the Pelly communication was the chief one, and that a lowering of its bed had turned the drainage permanently north-westward, and the connection with the Liard had become nearly or entirely dry. This has since been indicated on most charts; but, as the lake covers some four hundred and fifty square miles, fuller and confirmatory evidence would be very desirable. The Liard is an affluent of the Mackenzie, and the Pelly of the Yukon River.

THE STATE SURVEY OF NEW YORK.

THE veto of the appropriation for this survey by the late governor of New York caused only a partial suspension of its functions. The survey exists by reason of an organic law creating the commission, and defining its powers. Only by the repeal of this law can the survey be abolished. Its work has been confined to a triangulation so accurately executed as to form a reliable basis for all local surveys and topographical work; but the value of such careful measurements is somewhat difficult for the unscientific man to understand, and the results are not immediately apparent.

To remove all doubts regarding the excellence and economy of the work under their control, the commissioners requested an investigation by the U. S. coast and geodetic survey. After a full examination of the records of eight years' work, Superintendent Hilgard transmitted them to the state authorities, with his full indorsement.

By this appeal to a most competent authority, the commissioners and director of the New-York state survey have established the fact that the work slowly accomplished with small appropriations since 1876 has been done in the best way and at a small cost. Their report just made to the legislature, having vindicated the work of the past, recommends a radical change in the future policy of the survey. It is urged that New York should be warned by the experience of Massachusetts that a triangulation not immediately followed by a detailed topographical survey gives but little satisfaction to the people. The citizens of a state want reliable maps which they can use, not mere skeleton maps which are only available for surveyors. The board therefore recommends that the legislature enlarge its powers, and increase the appropriations for the state survey, so that topographical surveys may be at once begun in at least three counties, and be carried forward on such a scale as to permit of the economical performance of the work. The cost of the topographical work is estimated at from ten dollars to twenty dollars per square mile, depending upon the character of the country, and the scale of expenditure recommended is forty thousand dollars per annum. For this sum, complete maps of from three to five counties could be made each year, and the maps, by counties, issued within a year after the field-work is done. It is proposed to have the U. S. coast and geodetic survey complete the primary and secondary triangulations, leaving the funds of the state to be used for tertiary triangulation and topographical work.

The experience of the director of the survey, who is by law the engineering member of the state board of health, has proved conclusively the wide-spread need of topographical maps to aid in the sanitary work of the state. The commissioners therefore affirm that there is pressing necessity for topographical maps for sanitary works on water-supplies and drainage; that no survey can meet the wants of the people that does not result in a reliable map sufficiently detailed for ordinary practical and scientific purposes; and that the people have a right to expect that the benefits of the survey will be made immediately available in the form of useful maps.

PROPOSED NEW METHOD OF MEASURING THE DENSITY OF THE EARTH.

THE only known way of measuring the density of the earth is through the 'gravitation constant,' which expresses the attraction exerted by a known mass at a given distance. The bodies whose attractions have been measured are either mountains or portions of the earth, as in the well-known experiments of Maskelyne and Airy; or portable masses of lead, as used by Bailey and others. The difficulty in the way of the former experiments is the necessary uncertainty of the density of those portions of the earth's mass in

and below a mountain, or within any other extended region. The difficulty in the way of utilizing the masses of lead is the extreme minuteness of the attraction exerted by any manageable mass. On the whole, however, the latter method, in the hands of Bailey, Reich, and others, has been the more reliable of the two. A few years since, the late Professor Von Jolly of Munich undertook to measure the attraction of a globe of lead about one metre in diameter, upon a weight in the pan of a balance. The arm of the balance was at a height of twenty-one metres over the leaden globe, and the pan which held the weight was suspended by a wire of that length. It was balanced by a weight in the other pan immediately below the balance, so that the attraction was exerted only upon one weight.

A modification of Jolly's method was recently described in a paper read before the Berlin academy of sciences, by Arthur König and Franz Richarz. These gentlemen propose the following modification of the long suspension. They will cast a great block of lead in the shape of a parallelopiped. On the horizontal surface of this block will be placed an ordinary balance, the scales of which shall swing very near the surface. A vertical hole will be bored through the block, directly under the point of suspension of each scale of the balance; and a second pair of scale-pans will be suspended below the block by wires attached to the upper scale-pans, and passing through these openings. Thus the balance will consist of two pairs of scale-pans, — one pair below, the other above, — with the leaden mass between them. The masses whose attraction is to be measured will be placed, the one in the upper, and the other in the opposite, lower, pan of the scales. The attraction of the block will make the lower one lighter, and the upper one heavier. The positions will then be changed by removing the weight in the lower pan to the pan immediately above it, and *vice versa*. Then the attraction of the block will make heavier the weight which was before lighter, and *vice versa*, thus causing a difference in the weights amounting to four times the attraction of the block.

It is proper to add that this weighing method is subject to a good deal of criticism. So far as we are aware, its original inventor was Mr. C. S. Peirce, who proposed to utilize the Hoosac tunnel for the purpose, — to bore a hole from the surface of the earth vertically to the tunnel, and use it for the passage of a wire to hold a weight supported by a balance at the surface. It was found, however, that the air-currents, and other sources of disturbances, were such as to render the method inapplicable. It is difficult to see how Von Jolly's apparatus could have been free from the same difficulty. The attraction of his leaden sphere could only have been one five-millionth part of the weight, — a fraction which is about the extreme limit with which it is possible to effect a weighing under the most favorable conditions. With a block of any manageable size, the attraction by the method of König and Richarz will hardly reach a millionth part of the weight. Still the authors are making arrangements to execute their experiment, and physicists will look with interest for its result.

THE PREHISTORIC CONGRESS AT LISBON.

The prehistoric studies in Portugal of the late lamented Carlos Ribeiro have already been brought to our readers' notice (*Science*, Dec. 14, 1883). He was the leading spirit at the Lisbon congress, as well as its general secretary; and his long illness dating from that time, and his death, which took place Nov. 13, 1882, account for the delay in the appearance of this long-expected official report. It has now been given to the world in the most satisfactory manner, with beautiful typography and ample illustrations, under the charge of Sig. Delgado, who has succeeded to the position of director of the Geological bureau of Portugal. The freshness of it, however, is somewhat impaired, owing to the full *résumé* of the proceedings, that was given by Cartailhac in the *Matériaux*, November and December, 1880, and by Professor Bellucci, at even greater length, in *L'archivio per l'antropologia, e l'etnologia*, vol. xi. fasc. 3.

It was understood that the chief interest of this congress would centre about the discussion of the first question proposed: "Are there any proofs of the existence of man in Portugal during the tertiary epoch?" Ribeiro and the Portuguese geologists desired that foreign geologists and prehistoric archeologists should visit and thoroughly study at least one of the localities from which the supposed tertiary flints had mainly come. All this was accomplished, and the results are already well known. An excursion (somewhat of the nature of a picnic) was made to 'the desert of Otta,' about thirty miles north of Lisbon, where Professor Bellucci of Perugia found *in place*, in a miocene deposit, a flint flake with a well-marked 'bulb of percussion.' This was seen by several witnesses before it was detached, and by many experts was pronounced to be of undoubted human origin. To the writer, however, the engraved figure of it does not appear entirely convincing. Upon their return, the series of flint objects discovered in this locality by Ribeiro, during the past twenty years, was submitted to the judgment of a commission of nine experts. Their report, and the discussion that ensued thereupon, developed a great difference of opinion. Upon the geological question all were in accord with the Portuguese geologists, that the locality was the shore of a miocene lake. In regard to the archeological

Congrès international d'anthropologie et d'archéologie préhistoriques. Compte rendu de la neuvième session à Lisbonne, 1880. Lisbonne, *Typographie de l'Académie royale des sciences*, 1884. 49 + 723 p., 44 pl. 8°.

problem, many refused to admit the human origin of the flints; among them John Evans, whose competency to pronounce an opinion cannot be questioned. Of those who believed them to be the work of men, some thought that they were of more recent origin than the beds in which they were found. In their judgment, the flints came from the surface, and had been washed by floods into crevices previously existing in the miocene clays. Thus the question was practically left in the same condition in which it stood before: the sanguine believed that the existence of the *tertiary man* had been demonstrated, while the cautious waited for further evidence. We do not find in the report any thing essential added to the abstracts of the various arguments that have been previously published; and the editor apologizes for not having given any figures of the particular objects that served as the basis for discussion, on the ground, that, as Ribeiro had not made the necessary selection, he feared to do it himself, lest he might by chance omit some capital piece of evidence.

Many important papers in various departments of archeology, read before the congress, are here given at length, of which we have only space to allude to a few, especially such as relate to the antiquities of Portugal.

The publication of the careful account of the researches of Sen. Vasconcellos in the valley of the Douro, with the accompanying plates, will have a tendency to add Portugal to the list of the countries of Europe in which the quaternary gravels have yielded human implements. The objects found consist of a number of very rude quartzites of the St. Acheul type, which, however, some of the members refused to admit to be artificial at all. Thus far, no organic remains have been found accompanying them in this locality; but in a cavern at Furninha, near Peniche, on Cape Carvoeiro, Sen. Delgado has discovered a deposit of quaternary gravel, which had been introduced by a natural opening in the roof, and in this he found a fragment of a lower human jaw, together with a fine specimen of a flint axe of the St. Acheul type. These are all the instances given of the discovery of vestiges of the *quaternary man* in Portugal, although Sen. Ribeiro, in his opening address, alludes to them as having been made in the valley of the Tagus, in the district of Alemtejo, and near Coimbra.

One of the most interesting papers is Sen. Delgado's methodical and lucid narrative of his exploration of the cavern of Furninha, and of the discoveries made in it pertaining to the neolithic period. Great quantities of human bones were found, and many of them were broken, as if to extract the marrow, and calcined, precisely like those of animals used for food; so that the explanation of cannibalism at once suggests itself. But as pottery, polished stone axes, and other implements and ornaments were also found with them, Cartailhac stoutly maintained the theory that the cavern had been used as a place of sepulture. Although cannibalism has undoubtedly been practised by many modern savage races, its existence among the prehistoric peoples of western Europe is much disputed. An animated discussion upon this point, and a reference of the facts and arguments to a commission of experts, resulted in about an equal division of opinion.

Sen. Ribeiro gave an account of his exploration of kitchen-middens situated on the southern bank of the Tagus, about forty miles above Lisbon. The largest covered an area of some three hundred feet by a hundred and eighty, and was about twenty-one feet thick in its deepest part. The most remarkable circumstance connected with it was the discovery, in this restricted space, of no less than a hundred and twenty human skeletons, without any of the usual objects that accompany prehistoric interments. Not a trace of pottery was found, and such implements as were met with were of the rudest description, made of quartzite or flint and bone. Many bones of animals were scattered throughout the mass, but none of domestic animals except the dog. Like the kitchen-middens of Denmark, these seem to belong to the very beginning of the neolithic period. The study of the crania found in them, shows, according to Quatrefages, a type quite distinct from that of Cro-Magnon.

An entertaining paper by Sen. Pedroso gives an account of certain popular forms and customs in reference to marriage, still lingering in out-of-the-way villages in Portugal, which seem directly traceable to the ancient practices of polyandry and marriage by force.

The recent discoveries by Dr. Prunières in la Lozere, of several sepulchral caverns containing bones, in some of which stone arrow-heads are still embedded, are briefly noted. As the crania are all purely dolichocephalic, it is a fair inference that we have here proof of a struggle between the early race of Cro-Magnon and a brachycephalic, neolithic race of dolmen-builders who were acquainted with the use of the bow, since the arrow-heads precisely resemble those found in the dolmens.

We regret that we have no space to allude

to any more of the many valuable and important papers contained in this handsome volume.

The parliament of Roumania, upon the plea of poverty, has declined to extend an invitation to the congress to hold its next session the present year at Bucharest, which the leading members, under the initiative of the Baron de Baye, had selected as the place of meeting. We learn, however, that arrangements have been made for it to take place at Athens in 1886.

HARTLEBEN'S LIBRARY OF ELECTRICAL TECHNOLOGY (ELEKTROTECHNISCHE BIBLIOTHEK).

The admirable collection of treatises published under this title was originally announced to contain ten volumes; but the number issued has already reached twenty-six, and others are stated to be in preparation. Almost every subject relating to electricity receives attention, including telegraphy, telephony, electric lighting, and electroplating; while certain topics are very minutely discussed, as, for example, electrical conductors, electrical clocks, the medical uses of electricity, and its applications to military purposes. The various volumes, while necessarily somewhat unequal both in merit and in importance, are yet all of them of substantial value; and it is much to be desired that they may, in part at least, be translated into English for the benefit of that large class of readers who are desirous of securing information at once elementary and accurate. This has, indeed, already been done in the case of the initial volume of the series,—that on dynamo-electrical machinery, by Glaser-De Cew, which has been translated by Dr. Paget Higgs, and which, notwithstanding some minor slips, is by far the best treatise of its size upon the specific matters which it discusses. The treatise on instruments for electrical measurements, by Wilke, contains some interesting descriptions of special forms of galvanometers and electrometers; as, for example, the admirable dead-beat galvanometers with bell-shaped magnets made by Hartmann and other German makers, the special form of Thomson galvanometer made by Siemens & Halske, Kohlrausch's torsion electrometer, and Zöllner's bifilar electrometer. Zech's 'Elektrisches formelbuch' is of very high grade, and contains much information that is not easily found elsewhere in a collected form. Its topics are arranged alphabetically; and it contains, in an appendix, a brief electro-technical dictionary giving the equivalent electrical terms in German, French, and English. Its scope will best be indicated by a brief reference to a few titles selected almost at random. Under 'Bussole' we find a general discussion of the effect of a circular current on a magnetic needle, including the tangent, sine, and Helmholtz-Gaugain galvanometers, together with the cosine galvanometer of Professor Trowbridge; the latter assigned, however, to Obach and Denzler instead of to its real inventor. The article 'Dämpfung' gives a demonstration of the formulae for the damping of a magnet; and under 'Schwingung' there is given the derivation of the various formulae for vibrations, including vibration with damping and aperiodic motion. Another valuable work is that of Tumlirz on potential. Volume xx. of the library contains a bibliography of electricity from 1860 to 1883, with special reference to technical electricity. Among the more timely of the works relating especially to the industrial applications of electricity are those by Japing on the electrical transmission of power, and Krämer on electrical railways. The volume relating to multiple telegraphy not only contains the duplex and quadruplex systems, but also the multiple systems of Meyer, Granfeld, and Baudot are described at length. The American systems of Gray and Delany are not noticed, certainly a most unfortunate omission. The last volume issued, that on cable telegraphy, is the most comprehensive treatise on the subject that we know, and is particularly valuable, as works relating to it are so few.

RECENT GOVERNMENT REPORTS.

We regret that we are obliged to note a decided degeneration in the Bulletin of the fish-commission. What might and should properly be one of our most important government reports each year becomes less valuable. The present volume, although it contains several important scientific contributions, is in the main made up of unimportant letters, of value to very few people so far as we can judge. The first hundred and fifty pages are entirely occupied by lists and tables by the editor, not one of which is of importance to any class of people. What, for instance, can be the possible use of "A list of the blank forms and circulars of the U.S. fish-commission," which alone takes up twenty-one pages? Judging

Bulletin of the U.S. fish-commission, vol. iii. Washington, 1883.

Report of the U. S. fish-commission, part x. Washington, 1884.

Annual report of the Board of regents of the Smithsonian institution, for the year 1882. Washington, 1884.

Proceedings of the U. S. national museum, vol. vi. Washington, 1884.

the volume as a whole, we are driven to one of two conclusions, — either that there is a lack of good editorial judgment in preparing the volume and accepting articles for publication, or else there must be a lack of good articles. That the latter is the case we cannot believe.

Of an altogether different type is the Report of the fish-commission. Its greatest fault lies in the fact that it is extremely bulky, being composed of over eleven hundred pages; but this fault is partly hidden by the value of some of the articles. Among the most valuable contributions contained in the appendices are those by Verrill and Smith upon deep-sea animals, and by Ryder upon the embryography of osseous fishes and upon the development of the oyster. There are other important articles by Collins, McDonald, and others. We notice that in many of these papers there is a decided tendency toward the use of more space than is necessary to set forth the ideas of the author. This tends only to swell to unwieldy proportions an already bulky volume. There are two articles — one by McDonald, the other by Smiley — the value of which we fail to see: they are simple lists of the people who have received carp from the commission. If these had been left out, together with the equally superfluous lists of lakes and rivers of the United States, the report would have been shortened by at least two hundred and fifty pages. The idea of separately paging the different articles, and furnishing them each with an index, is good.

In addition to the report of the secretary, a new and important feature, the report of the assistant director of the National museum, is introduced into the Annual report of the Smithsonian institution. The appendices, which have been introduced in the last three volumes under the title of 'Record of recent scientific progress,' are continued in this report. These are very good summaries, and are written by some of our most eminent scientific men; still we doubt if they are of any considerable value. The specialist in each branch treated must necessarily know as much as is contained in the article upon his own branch, and all are certainly too concise to be of popular interest. The idea, however, is excellent; and if the Smithsonian could each year publish separate bulletins, each one covering one of the branches of natural science, and if each one should be made to occupy several times as much space, and be written in a more popular style, we think that they would soon come to be recognized as the most important publications of the institution by all who are interested in the natural sciences.

The last volume of the Proceedings of the national museum shows a decided improvement over all the others. It is even richer in important articles than any previous one, such men as Smith, Bean, Jordan, Ryder, Gill, and Ridgeway, being among the chief contributors. A noticeable feature of this volume is, that among its list of contributors are the names of two women. This is a comparatively new feature in American science. The chief fault of the volume lies in the appendices, which are entirely out of keeping with the rest of the volume. Such articles as "Brief directions for removing and preserving the skins of mammals," although very valuable to young collectors, are out of place here. The volume for this year shows signs of careful editorial work; but the index could be improved by printing it in treble columns, to bring more under the eye at once.

NOTES AND NEWS.

MR. SIDNEY GILCHRIST THOMAS, whose name is connected with the Thomas-Gilchrist patent for the conversion of phosphoric pig-iron into steel, died in Paris on Sunday morning, Feb. 1. Mr. Thomas, says the *Athenaeum*, was educated at Dulwich college, and was intended for the medical profession; but on the death of his father he entered the civil service. He was excessively fond of chemistry, and devoted all his leisure to the study of that science. In 1878 he read before the Iron and steel institute a paper on the elimination of phosphorus, in which he announced the discovery which he and his relative, Mr. Gilchrist, had made. The dephosphorization or basic process, as it is usually termed, renders available for the production of steel the pig-iron smelted from spathic and less pure ores of England. This process was thought so highly of, that Mr. Thomas was presented by the Iron and steel institute with the Bessemer gold medal. The labors of Mr. Thomas in establishing the basic process in Germany, where it is most extensively employed, in France, and in England, told severely upon a constitution always inclined to be delicate. A voyage to Australia, and a residence for some time in Algeria, appeared to give hopes of his ultimate recovery; but on his return to Paris he became worse, and on Sunday morning (Feb. 1) he breathed his last, at the early age of thirty-six.

— The Académie d'aérostation météorologique of Paris held a celebration, on the 15th of January, of the centennial of the balloon-voyage of Blanchard and Jeffries across the English Channel. On account of an accident, the *fête*, which was held at the seat of W. de Fonvielle, was postponed from the 7th, the actual date of the transit. It is now proposed to hold a celebration in the forest of Guines on the 25th of May, on the spot where the balloon landed, and where a monument has been erected.

— The *Annales industrielles* gives an account of the making of cork bricks, now being employed for coating steam-boilers, ice-cellars, etc. The cork is winnowed from impurities, ground in a mill, kneaded up with a suitable cement, and pressed into bricks; then dried, first in the air, and afterwards by artificial heat. They are not hard, and not liable to decomposition: they keep out moisture, heat, cold, and sound.

— The Russian government is preparing an expedition to western Siberia for the purpose of examining some sulphur deposits recently discovered there. The natives have for many years had knowledge of these deposits, but the government has only recently been made cognizant thereof, through a report by Lieut. Kalityn. The deposits are said to rival those of Sicily. In Russia, sulphur has hitherto been found only at Ichirkota, not far from Petroffsk in Daghestan, which has chiefly been delivered to the powder-mills.

— The Journal of the Iron and steel institute states, that with a view to lessen the noise caused by the trains crossing the railway-bridges in Hannover, Germany, due to the violent vibrations of the rail-joints, the original rails have been taken up, and steel ones, eighty-eight feet six inches long, laid down in their place. The new rails were manufactured at the Osnabruck steel-works, and the result of the innovation is in every way satisfactory.

— In the *Medical chronicle*, Dr. D. J. Leech discusses the properties of paraldehyde, a new stimulating sedative drug which is likely to take a prominent place in the pharmacy of the future. It is intermediate, apparently, between opium and chloral. It is well known that chloral has been freely used as an intoxicant, mainly because it leaves no after-odor, and may be taken without detection. Paraldehyde has the advantage, from one point of view, of presenting a distinct and easily identified smell. Dr. Leech speaks of having employed paraldehyde as an aid in breaking off the habit of opium-taking, and in helping a patient to pass through the miseries which followed the abrupt discontinuance of long-continued and large doses of morphia.

— The exhibition of metal work, to be held at the quaint old town of Nuremberg, is in a sufficiently forward state of preparation to show what it will be like. Berlin exhibits principally vessels, lamps, and bronze figures. England is badly represented, leaving the more space for Austria and France. On the other hand, Spain and Portugal show no modern work at all, but Italy is represented by several towns. America shows only work in aluminium. Japan has sent so much that a special commissioner has come with the goods. The Chinese war has prevented many exhibits from there. Turkey and Persia send a great deal, Greece nothing. Other countries have sent national ornaments.

— Every one has noticed that the sun and moon, in rising or setting, appear unusually large. Paul Stroobant points out (*Bull. acad. roy. belg.*) the absurdity of the vulgar explanation that intervening objects enable us better to estimate the real size of the heavenly bodies, in that the same effect is visible at sea, and indicates the fallacy of several other theories. He believes that there are two real causes of the phenomenon in question, both purely physiological, — one, the greater sensitiveness of the eye to angular magnitudes near the horizon; the other, a direct effect of the feebler light in the enlargement of the pupil, which, it would appear, tends to magnify objects, even when artificially produced. His theories are supported with numerous illustrations and experiments, the most interesting of which are to show that the distance between two luminous points within a room suffers the same apparent change as in the constellations, when, without altering the distance from the eye, the altitude is gradually increased; and the maximum augmentation is estimated in either case as about one part in four.

— It is stated in the Journal of the Iron and steel institute that an accident at a foundry in Melbourne, by which a red-hot iron casting was dropped into water, and was afterwards found to have become remarkably soft, originated a process for annealing chilled and other iron castings, which has just been patented in the United Kingdom. It consists in plunging the metal when it is reduced to a very dull-red heat, and just as the redness is about to disappear, into a mixture of treacle and water having a specific gravity of 1.005. The inventors do not confine themselves to this solution only; but it is found to give better results than any other that they have tried. The process is said to soften castings in such a degree that they can be punched, bored, and tapped as readily as wrought metal.

— W. T. Chamberlain of Norwich, Conn., has invented a cartridge in which the metal shell is filled with compressed air, and attached to the base of the projectile. A valve in the base of the shell permits the air to escape at will into the chamber of the gun, and the bullet is thus projected. He states, that, notwithstanding the imperfection of his apparatus, he has secured a range of half a mile with two hundred pounds' pressure.

— The *Academy* announces that the syndics of the University press (Cambridge, Eng.) have undertaken the publication of a 'History of the mathematical theories of elasticity,' left in manuscript by the late Dr. Todhunter. The work of editing and completing has been intrusted to Mr. Karl Pearson. The history will contain a complete bibliographic account, so far as possible, of all the writings on the subject of elasticity since the time of Galilei, including an analysis of the more important memoirs. The first portion is already passing through the press.

— By reference to the table given below, it will be seen that one of the most noticeable features of the observations made at the Russian polar station at Sagastyr, during the two seasons 1882–83 and 1883–84, was the relative steadiness of the temperature in comparison with other stations in high latitudes. Only in November, February, and March did the means for the two years differ by more than 2° C.

The first year the means diminished to February, and then rose. The second year the change was not so regular. This is in marked contrast to the extreme variations from month to month, experienced on the islands of the European polar sea and their vicinity (Jan Mayen, Bear Island, Spitzbergen, Novaia Zemlia, and Franz Josef Land), as well as in the North-American archipelago. In both seasons the number of auroras increased from September to a maximum in February, and then decreased rapidly.

Mean temperatures (Centigrade) and number of hours of auroras at the Russian polar station of Sagastyr, mouth of the Lena.

	Temperature.		Hours auroras.	
	1882-83.	1883-84.	1882-83.	1883-84.
September	0.1	0.6	13	23
October	−15.1	−14.1	87	69
November	−27.9	−25.7	179	83
December	−33.5	−33.3	191	178
January	−37.2	−35.8	194	151
February	−41.3	−34.0	197	126
March	−31.5	−35.2	137	118
April	−20.7	−21.8	10	8
May	− 8.1	− 9.7	–	–
June	0.9	− 0.2	–	–
July	5.1	–	–	–
August	3.8	–	–	–
Year	−17.1	–	–	–
General mean		−16.7	–	–

— We learn from the *Athenæum* that three new tidal observatories have recently been established in Indian seas, — one at Cochin, and two at Ceylon. There are now, in all, twelve such observatories in those seas, each continuing its work for a period of five years, as tidal observation has this advantage over land meteorology, — that, after a limited time, a particular locality is exhausted, and the instruments can be taken up and moved elsewhere. These observatories have recently absorbed a great deal of the attention of the Indian survey department; although their results bear only in a strictly scientific way upon the operations of the trigonometrical survey, and in helping to correct the charts and tables which are furnished to the practical navigator.

— The *Independent practitioner* for January contains an article by Dr. J. G. Van Marter of Rome, upon evidences of prehistoric dentistry in Italy. In the museum of Corneto-Tarquinius, a city on the Mediterranean coast, the author found two specimens of ancient dentistry, which the mayor of that city certifies were found upon the first opening of the buried Etruscan tombs. Professor Helbig further assures him that these were virgin tombs, which date back four or five hundred years before the Christian era. In one of the specimens the two superior central incisors are bound by a band of very soft gold to the teeth on either side. The artificial teeth are well carved, evidently from the tooth of some large animal. One other artificial tooth was held by the same band, but it is lost. Dr. Van Marter has in his own possession a skull in which the first upper molar on the right side is missing, and which shows plain marks of an alveolar abscess, proving conclusively the existence of toothache among the early Etruscans. As the tombs have been only slightly explored, and as only the noted men of Etruria were embalmed, the rest being cremated, it is not strange that these evidences of dentistry have been so long undiscovered.

— At a meeting of the Society Isis, Jan. 15, Professor Hempel, Dresden, Saxony, made a communication concerning his chemical analysis of the air, especially of the air collected daily by Prof. E. Hagen during his voyage from Liverpool to New York in 1883. The results may be summed up as follows: 1. The quantity of oxygen changes from day to day by one-half per cent; 2. The quantity of oxygen in the air seems to be larger the lower the barometer, and *vice versa*; 3. The air taken on the ocean, compared with the air taken by Professor Hempel the same day at Dresden, shows the same composition. The quantity of oxygen may vary on different days by one-half per cent; but the air from the ocean varied from the air of Dresden only by some hundredth parts of one per cent. Professor Hempel intends to continue his studies, and hopes to receive sets of tubes with air obtained from the meteorological stations nearest the north pole and the equator, and from one between, perhaps from Heligoland. He expects to find variations in the quantity of oxygen in these widely separated places, though they were not found in the specimens obtained in Dresden, and on the voyage from Liverpool to New York, because both are of about the same latitude, and influenced by the same currents of wind. Professor Hempel intends, therefore, next fall to go to New York, *via* Teneriffe, and to collect on the top of the peak, and at the bottom, air from the upper and lower trade winds.

— According to notes made by Mr. L. Belding at Zorillo and other places near La Paz, Lower California, in 1883, the Pericue Indians, the original inhabitants of that region, are now represented by a single individual, — an old woman of about seventy years, who was universally reputed to be a pure-blooded Indian, the last of her race. She was of good stature, robust frame, and dark complexion. The Indians south of 24° 30′ buried their dead in caves, or below shelving rocks, without regard to the points of the compass. The bones which were found were usually painted red. The skeleton of an adult male, found by Mr. Belding, was wrapped in cloth made from the bark of the palm, and bound with three-ply cord, plaited as sailors make sennit, the material being the fibre of the agave. The package, which was about twenty inches long, nearly all the bones having been disjointed, did not appear to have been disturbed since burial, although a femur and some of the small bones were missing. This skeleton was found in a small cave at Zorillo, the floor of which was covered about a foot deep with dry, coarse sand, formed from the disintegrating granite rock.

— This last season a small apple-tree on the shore of Todos Santos Bay, Lower California, blossomed and bore large, perfect fruit on its trunk, about an inch from the ground.

— A Mr. Lorenz of Baden has invented a new compound projectile for infantry rifles, which consists of a steel case with a core of lead. In the experiments made the projectile penetrated three millimetres of iron, twenty-seven centimetres of beech-wood, and forty centimetres of fir-wood; in all, 67.3 centimetres, placed at a distance of thirty paces from the muzzle of the rifle. The projectile was unchanged in shape, and the lead core remained firm.

— Dr. Everest, who crossed the Yukon Portage last summer, reports from Fort Reliance, Yukon River, his safe arrival there July 22, 1884. He found miners on the river seventy-five miles above Fort Selkirk, who reported very rich washings on a bar in the river, the gold-dust being very fine and scaly. He intended to ascend the White River last autumn, and, if possible, to cross to the Copper River this spring, and descend to its mouth. The country seemed to him to resemble northern Idaho, with rolling hills densely wooded with larch and poplar and willows along the river-banks, and luxuriant herbage.

— A course of public lectures has been commenced at San Diego, Cal., under the auspices of the Society of natural history, the proceeds to go toward a building-fund. The first was delivered by Mrs. Elizabeth Surr, lately of London; and the second by Dr. Frank Cowan, during the stay of the surveying steamer Carlile P. Patterson, on which Dr. Cowan was a guest during its voyage from the east, on the way to Alaska, where it is to be stationed.

— In a recent bulletin of the Geological society of France, Oehlert gives the result of an important study of certain imperfectly known types of Devonian brachiopods long since described by D'Orbigny, and which are fully illustrated. The memoir places on a sound basis the section of Rhynchonella named Uncinulus by Bayle, while Uncinulina of the same author is shown to be untenable. The paper is particularly important as a contribution to our knowledge of the Phynchonellidae.

— Dr. Theodore Stein has succeeded in obtaining photographs of the larynx. The throat and larynx are illuminated by an incandescent electrical lamp, cooled by Nitze's system of cooling by water. A small mirror reflects the image on a gelatine-bromide plate in a camera-obscura, and a photograph is obtained showing the organs in health or disease, thus removing all risks of laryngeal diseases by inhaling the breath.

— C. F. im Thurm, the German explorer of British Guiana, has undertaken a new expedition into the interior of this colony, in order to climb Mount Roraima. At a height of 5,600 feet above the sea-level he found a veritable garden of orchids; and, still more wonderful, on his way thither he found a tribe of Indians conducting a Christian service without a missionary among them.

— A cable despatch was received March 7, at the Harvard college observatory, from Dr. Krueger of Kiel, announcing the discovery of a new planet of the eleventh magnitude by Borelly on March 64.3650 Greenwich mean time; right ascension, 11 h. 6 m. 13.5 s.; declination, + 7° 9′ 17″; daily motion, — 48 s. in right ascension, — 9′ in declination.

— The fourth course of free scientific lectures given by the Cincinnati society of natural history was concluded on March 6. The attendance, in spite of the weather, has been excellent. Among the lectures were 'Water-crystallization,' by Prof. William L. Dudley; 'Ancient vegetation of the earth,' by Prof. Jos. F. James; and 'Diatoms,' by Ex-Gov. Jacob D. Cox.

— The council of the Royal meteorological society was announced to hold at the Institution of civil engineers, on the evenings of March 18 and 19, an exhibition of sunshine-recorders and solar and terrestrial radiation instruments. The society will also exhibit any new meteorological apparatus invented or first constructed during the past year, as well as photographs and drawings possessing meteorological interest.

— Mr. Eugen Himly, in the *Photographic news*, Jan. 2, 1885, describes an apparatus to avoid the brilliant glare of an artificial light in photography. He conceals the light in a case from which the rays are thrown out by reflectors. This diffuser is mounted upon a rail on the ceiling, and can be slowly moved along this during the exposure, thus giving to all sides of the picture an equal brightness.

— At the meeting of the Gesellschaft für erdkunde in Berlin, Jan. 3, Dr. Steinmann read a paper on his journeys in southern Patagonia. In 1882 he went as geological assistant to the fourth German expedition to Punta Arenas, mainly with the object of studying the southern cordilleras. What struck him particularly here was the extraordinary difference in the plant forms to those of the southern cordilleras. While on the western slopes vegetation is rich in forms, the climate of the steppes reigns on the eastern side. From a geological point of view, the southern point of America is extremely simple in its build, but it is of a different character on the east and west. On the east, chalk formations occur almost entirely; while on the west, where there are innumerable islands, there is nothing but granite and crystalline rocks. Although the configuration of the coast has been studied thoroughly by the English, Dr. Steinmann thinks that many important questions have still to be settled; for instance, whether Laguna Blanca, lying to the north-east of the settlement Kyrsing Water, has an outlet to the west. Ultimately, the lecturer reached the laguna of the third settlement of Santa Cruz, of which it may with certainty be said that it was connected, until recently, with the Pacific Ocean. It may also be concluded that at that time the mainland was much more cut up by channels and waterways than it is now. In May, 1883, Dr. Steinmann visited, in the company of Fuegian seal-hunters, the islands south of the Straits of Magellan, including Tierra del Fuego. Ultimately, he made his way from the southern point of America to Bolivia, and here continued his investigations.